



USAID
FROM THE AMERICAN PEOPLE

**HYDRO POWER AND ENERGY
PLANNING PROJECT (HPEP)**

INITIAL STEPS TO HOURLY BASED ELECTRICITY MARKET IN GEORGIA

October, 2013



USAID
FROM THE AMERICAN PEOPLE

HYDRO POWER AND ENERGY PLANNING PROJECT (HPEP)

TRANSITION TO NEW MARKET MODEL IN GEORGIA

Phase 1

- Improve scheduling skills for all market participants and service providers
- Implement month ahead and day ahead scheduling for bi-lateral contracting on hourly basis
- Develop “Day Ahead Planning” concept for all market participants

Phase 2

- Develop of direct “take or pay” bilateral contracting system
- Implement DAP
- Develop new hourly imbalance service/deviation mechanism;

Phase 3

- Develop and introduce hourly balancing market and settlement system

Phase 4

- Develop and implement day ahead power exchange (PX)



USAID
FROM THE AMERICAN PEOPLE

**HYDRO POWER AND ENERGY
PLANNING PROJECT (HPEP)**

This presentation is dedicated to the specific mechanisms of implementing the tasks under Phase 1 and Phase 2, above.

Main tasks to be solved:

1. Scheduling for each hour for Month and Day ahead
2. New bilateral contracts system;
3. New balancing mechanism;
4. Indicative Pricing.



USAID
FROM THE AMERICAN PEOPLE

**HYDRO POWER AND ENERGY
PLANNING PROJECT (HPEP)**

KEY DEFINITIONS:

Day Ahead Scheduling is a hourly scheduling of generation/consumption for next day.

Month Ahead Planning is a hourly system planning for a next month.

Day Ahead Planning is a set of actions carried out under the coordination of the Market Operator in order to balance the foreseen hourly demand regarding the following day on the day ahead.

Balancing Mechanism includes activities which compliment bilateral contracts and used to balance supply and demand in each half hour trading period of every day



USAID
FROM THE AMERICAN PEOPLE

**HYDRO POWER AND ENERGY
PLANNING PROJECT (HPEP)**

THE FOLLOWING MAIN FACTORS SHOULD BE TAKEN INTO CONSIDERATION:

- Protection of domestic consumers;
- Creation of incentives for private investors into new Georgian HPPs;
- Creation of favorable conditions for traders for beneficial export of electricity.



USAID
FROM THE AMERICAN PEOPLE

**HYDRO POWER AND ENERGY
PLANNING PROJECT (HPEP)**

MONTH AHEAD PLANNING

The proposed mechanism consists of the following:

- Receive and filtering of historical data (1-3 years) on purchase/sale of electricity
- Sort by selected typical days
- Define the averaged shape of the curve for each typical day of the month
- Define separate methodologies for regulated HPPs and TPPs using (Perhaps using GT Max methodology)
- Adjust for the difference between electricity volumes by averaged typical day, the weekly dynamics of changes of electricity volumes, and the synchronization of planned and historic years' calendar.
- Checking the hourly system balances and regimes on technical feasibility

As a result planned capacities for each hour for coming month are determined.



USAID
FROM THE AMERICAN PEOPLE

**HYDRO POWER AND ENERGY
PLANNING PROJECT (HPEP)**

DAY AHEAD SCHEDULING

For improvement of planning accuracy day Ahead scheduling must be implemented based on MAP curves.

The result is the planned curves of market participants for the (N+1) day, where N is the current day.

Day Ahead Scheduling involves a series of steps, as follows:

- Submission of hourly nominations by market participants;
- Preparation of hourly balances by TSO;
- Regimes verification on the technical feasibility by TSO with possible adjustments;
- TSO's approval of next day dispatch schedule by hours.

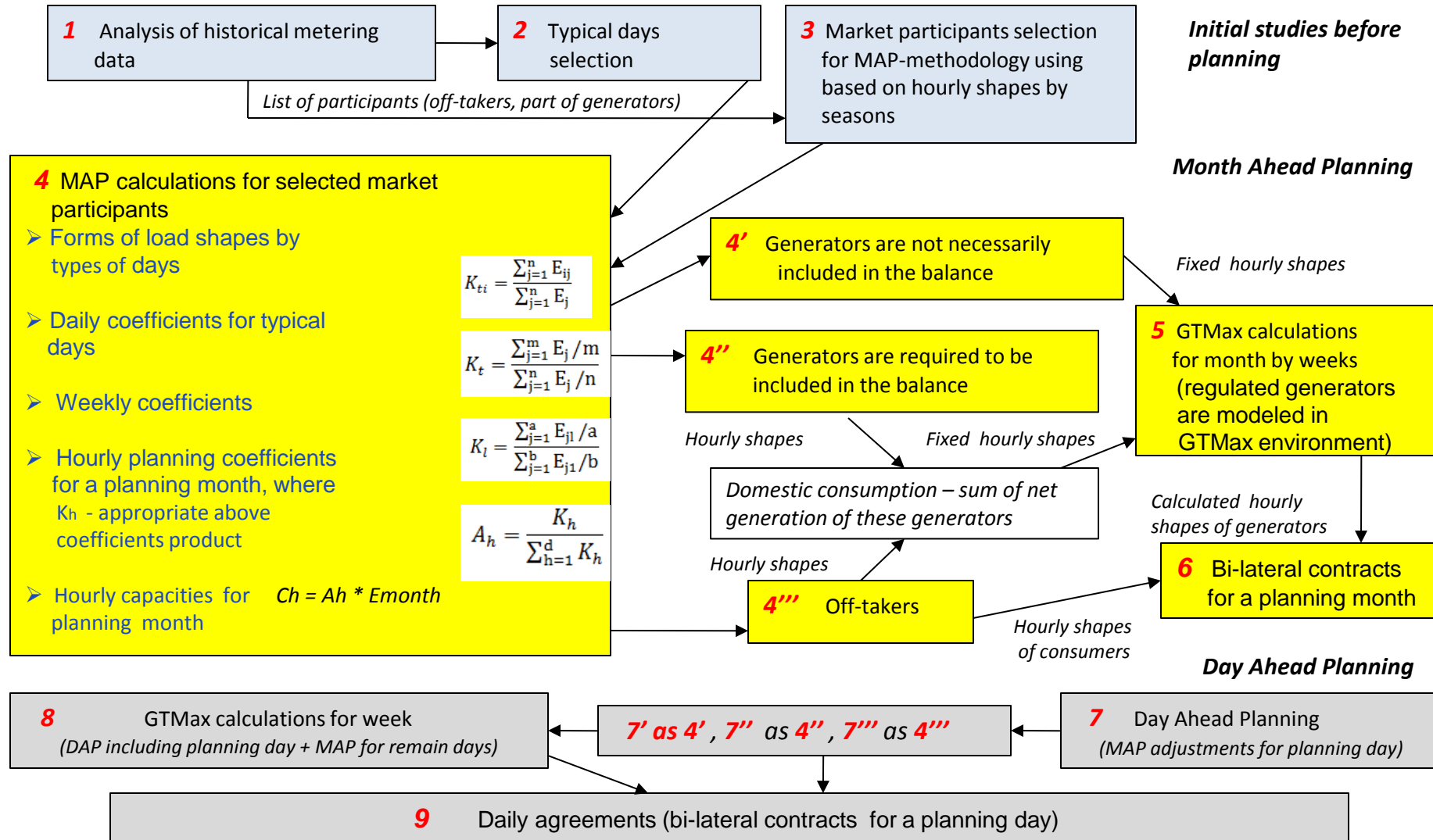


DAY AHEAD PLANNING

- DAP is the wholesale electricity market established for sale transactions day ahead on the basis of settlement period;
- Precursor of day ahead market;
- First stage of DAP is to develop scheduling ability;
- Each producer, trader, and off-taker provides an estimate of their net electricity forecasts for the next day by hours;
- Power producers provide bids/offers for energy by hourly nominations;
- Eventually the differences between forecast and actual become liabilities under the balancing mechanism;
- Settlement can be done daily;
- DAP requires software and metering database.



DAP AND BI-LATERAL CONTRACTING METHODOLOGY





BI-LATERAL CONTRACTS

The main purpose of new system of hourly bi-lateral contracts is to use “take or pay” principle without any adjustments.

Three basic modes of bi-lateral contracting are considered:

Model 1. *Full pool;*

Model 2. *Partial pool + free negotiation amongst market participants on a monthly basis;*

Model 3. *Partial pool & free negotiation among participants on a monthly and daily basis .*



BI-LATERAL CONTRACTS (CONTINUED)

Model 3 appears the most feasible and it is chosen as the base model.

There are two proposed types of contracts for planning month.

Type 1 Partial pool (full matrix) – selected generators by seasons and all consumers

In this case, main purpose of bi-lateral contracts is to minimize the generation price for domestic customers and also allocate this generation (including expensive) between all domestic consumers “fairly by volumes”.

Type 2 Free negotiations between market participants

This type of contract corresponds to today's practice, but in the future, they should be on an hourly basis.

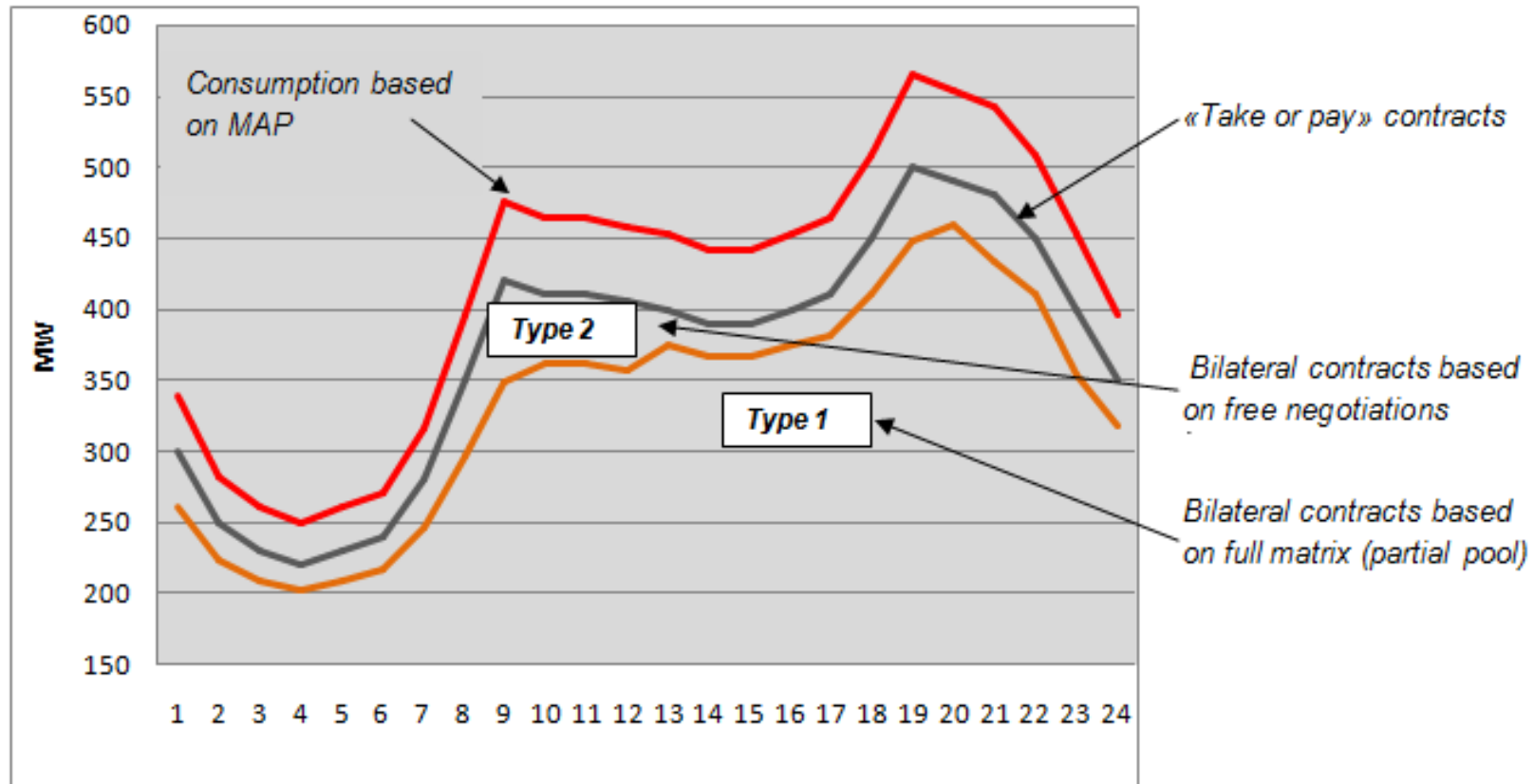


USAID
FROM THE AMERICAN PEOPLE

HYDRO POWER AND ENERGY PLANNING PROJECT (HPEP)

BI-LATERAL CONTRACTS (CONTINUED)

Contracts on monthly basis



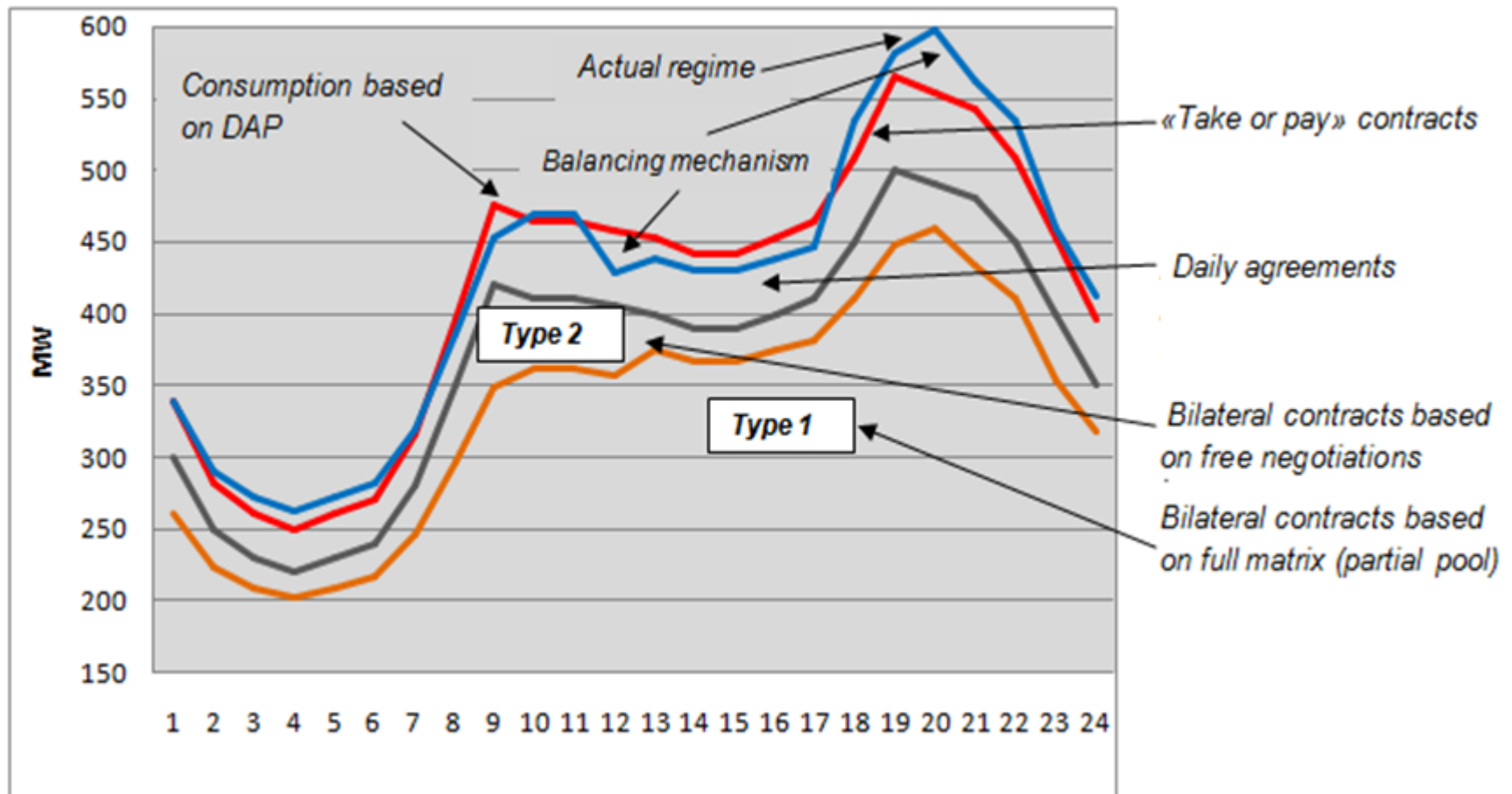


USAID
FROM THE AMERICAN PEOPLE

HYDRO POWER AND ENERGY PLANNING PROJECT (HPEP)

BI-LATERAL CONTRACTS (CONTINUED)

Contracts and balancing

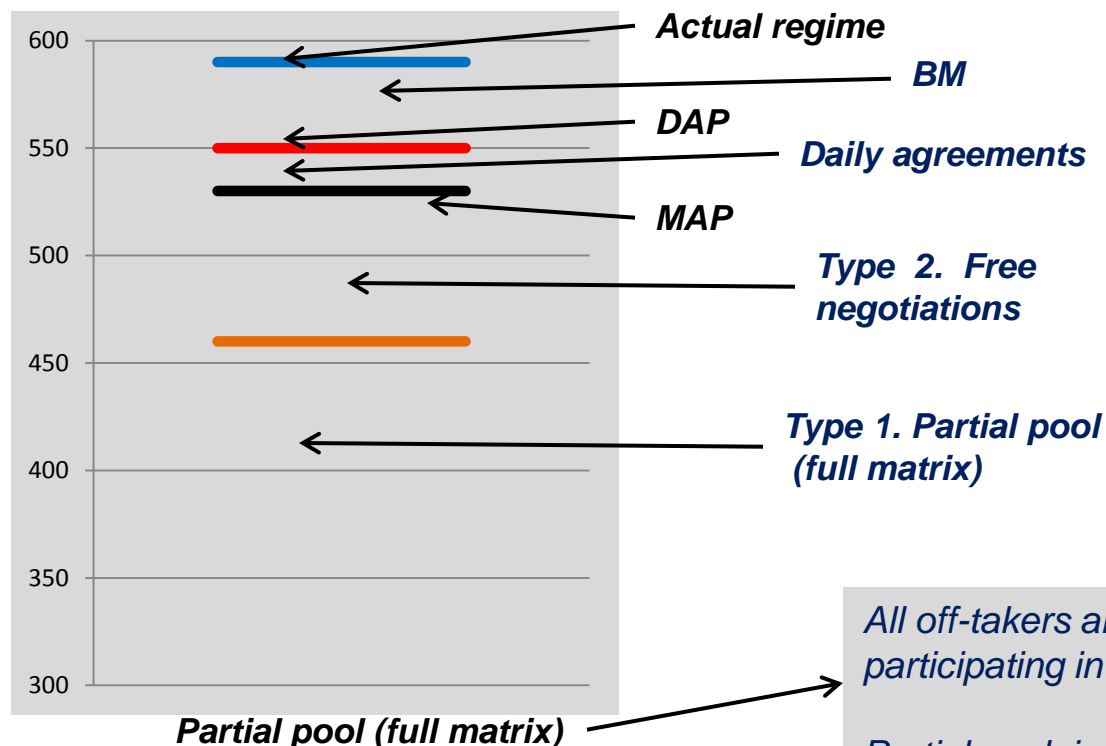




USAID
FROM THE AMERICAN PEOPLE

HYDRO POWER AND ENERGY PLANNING PROJECT (HPEP)

ELECTRICITY TRADE FOR ONE HOUR (EXAMPLE)



In this example for off-taker for one hour MAP is fully covered by bi-lateral contracts (Types 1 and 2).

Difference between DAP and monthly bi-lateral contracts is covered by daily agreements

In any case balancing mechanism is a difference between actual regime and sum of bi-lateral contracts regardless of sign of deviation.

All off-takers and selected generators by seasons are participating in partial pool (N=constant, M-variable).

Partial pool is needed for cheap electricity from regulated HPPs and expensive power from TPPs fairly allocation between all off-takers.

For each off-taker bi-lateral with each generator are determined in proportion of consumption for each hour (i)

	Off-taker 1	Off-taker N
Generator 1	a_{11i}	a_{1ni}
.....
Generator M	a_{m1i}	a_{mni}



USAID
FROM THE AMERICAN PEOPLE

**HYDRO POWER AND ENERGY
PLANNING PROJECT (HPEP)**

BALANCING MECHANISM

- According to GEMM 2015, the Stage 1 does not include the implementation of the system of bids and offers with prices, which does not allow for the possibility of the full-fledged functioning of the balancing market.
- The balancing mechanism is actually at first stage is imbalance service.
- The important point is to determine the degree of responsibility for each participant and dispatcher for each deviation (the reason, sign of the deviation), which will be expressed in an appropriate fee for the deviation for what it's necessary to develop the appropriate pricing system.



CONCLUSION

For successful transition to hourly planning (DAP) and new contracting mechanism, the following works to be performed :

1. To align the concept of DAP and new contracting methodology with all stakeholders – manage transitional process to “daily” market
2. To improve scheduling process
3. To develop detail algorithms for DAP
4. Develop metering data rules and DAP software
5. To begin simulations
6. To make adjustments in software based on simulation results



USAID
FROM THE AMERICAN PEOPLE

**HYDRO POWER AND ENERGY
PLANNING PROJECT (HPEP)**

CONTACT:

Sukru Bogut, COTR, Energy Advisor, USAID
sbogut@usaid.gov

Michael Jake Delphia, Chief of Party, HPEP
jdelfhia@deloitte.com

Zviad Gachechiladze, MO Team Lead, HPEP
zgachechiladze@dcop-hpep.ge

Nikoloz Sumbadze, Power Market Advisor, HPEP
nsumbadze@hpep.ge



USAID
FROM THE AMERICAN PEOPLE

**HYDRO POWER AND ENERGY
PLANNING PROJECT (HPEP)**

Thank you!